TOSHIBA

译文

TB6584AFNG

本资料是为了参考的目的由原始文档翻译而来。

使用本资料时，请务必确认原始文档关联的最新信息，并遵守其相关指示。

原本: “TB6584AFNG” 2016-02-22

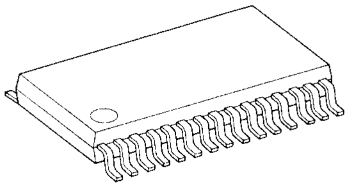
翻译日: 2016-12-01

TOSHIBA Bi-CMOS Integrated Circuit Silicon Monolithic

TB6584AFNG

3-相全波正弦波 PWM 无刷马达控制器

TB6584AFNG 为三-相无刷 DC 马达的马达风扇应用而设计.

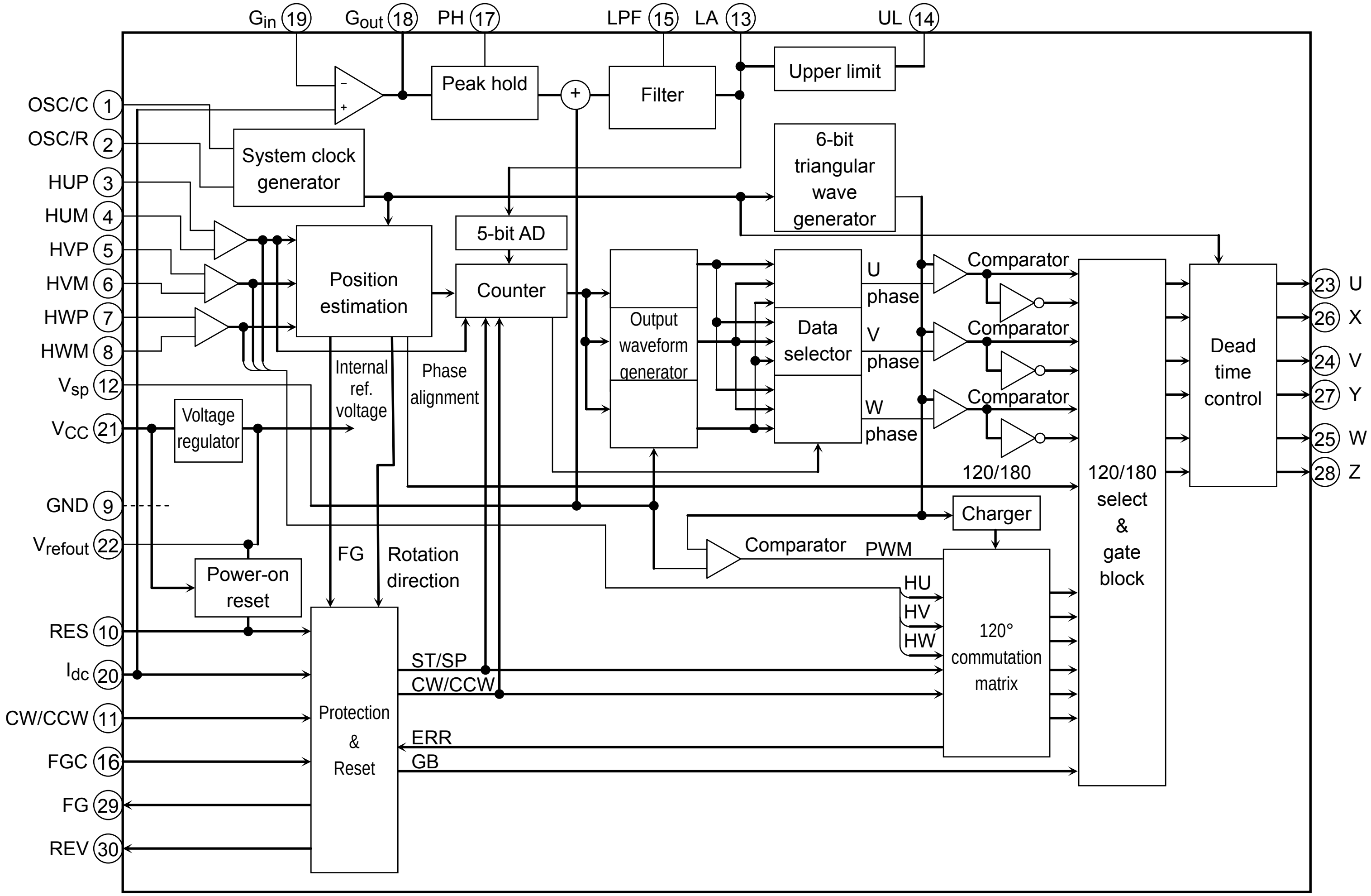

SSOP30-P-300-0.65

重量: 0.17 g (typ.)

特征

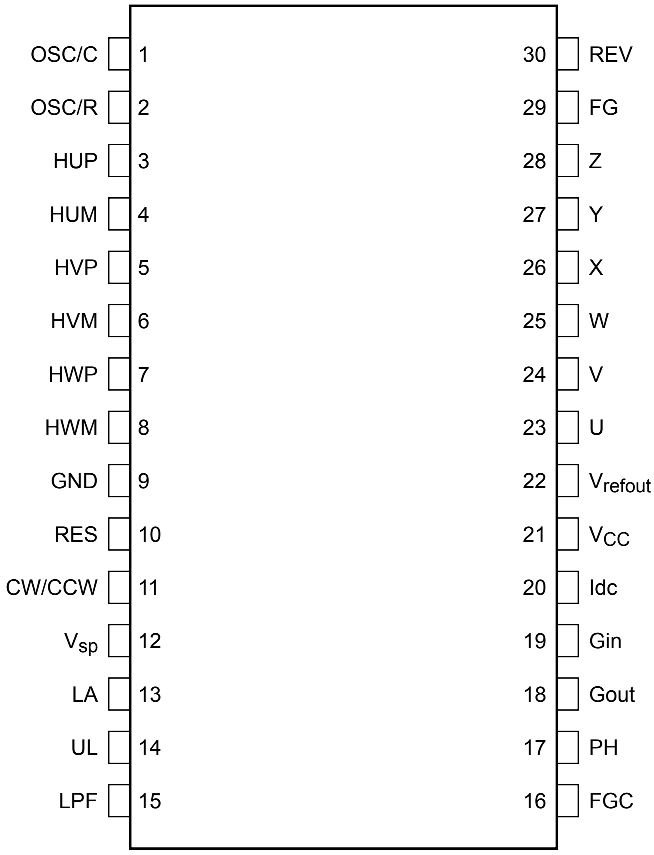
- 正弦 PWM 控制
- 三角波发生器
  (有 f_{osc}/252 Hz 的载波频率)
- 超前角控制 (0° ~ 58° 以 32 独立步)
  外部设置或自动内部控制
- 电流-限制输入引脚
- 内部电压稳压器电路 (V_{refout} = 5 V (typ.), 30 mA (max))
- 工作供电电压范围: V_{CC} = 6 V ~ 16.5 V

方块图



以上方块图中，出于解释目的，可能忽略或简化部分功能块或常数.

引脚配置



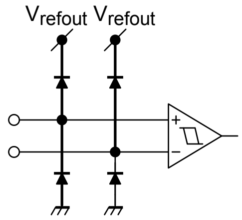
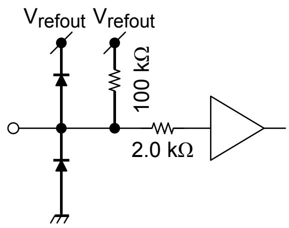
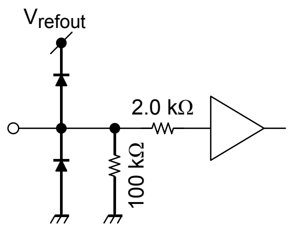
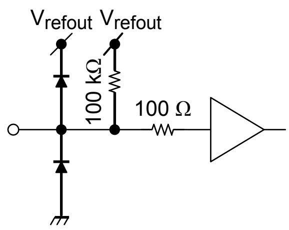
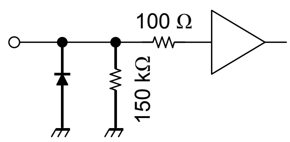
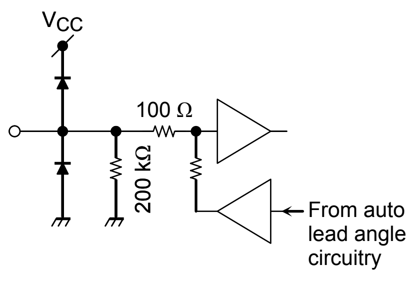
OSC/C 1
OSC/R 2
HUP 3
HUM 4
HVP 5
HVM 6
HWP 7
HWM 8
GND 9
RES 10
CW/CCW 11
V_{sp} 12
LA 13
UL 14
LPF 15
30 REV
29 FG
28 Z
27 Y
26 X
25 W
24 V
23 U
22 V_{refout}
21 V_{CC}
20 Idc
19 Gin
18 Gout
17 PH
16 FGC

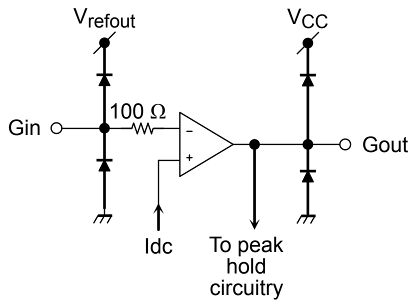
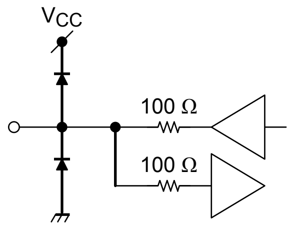
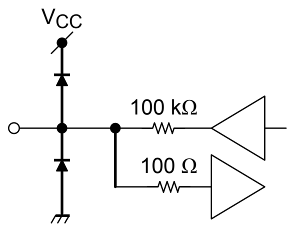
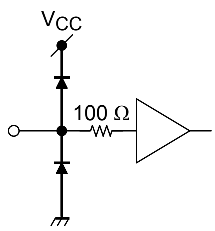
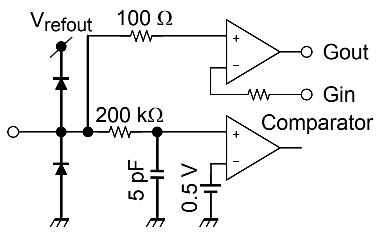
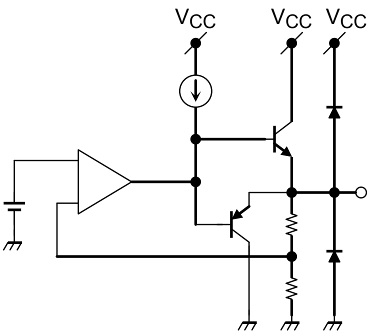
引脚描述

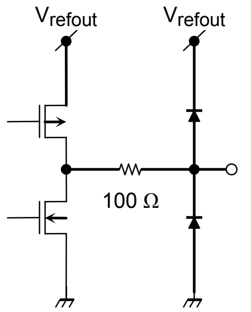
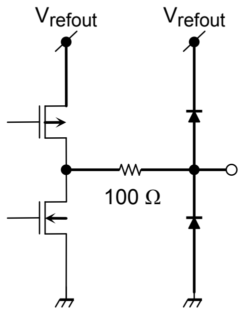
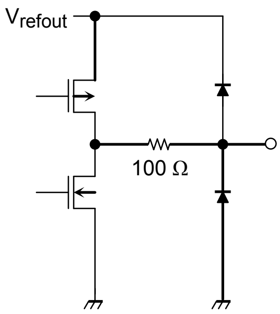
引脚 No.	符号	功能	描述
1	OSC/C	振荡器电容	CR 振荡
2	OSC/R	振荡器电阻	
3	HUP	位置信号输入, U	门块保护被激活当 UVW = 111 或 000 时. 这些输入有内部数字过滤器 (≃ 500 ns)
4	HUM		
5	HVP	位置信号输入, V	
6	HVM		
7	HWP	位置信号输入, W	
8	HWM		
9	GND	接地	—
10	RES	复位输入	L: 转动马达. H: 停止马达. (励磁输出信号被强制低.) RES 输入有内部下拉电阻.
11	CW/CCW	顺时针/逆时针 旋转	L: 顺时针 旋转 H: 逆时针 旋转 CW/CCW 输入有内部上拉电阻.
12	V_{sp}	电压命令输入	V_{sp} 输入有内部下拉电阻.
13	LA	超前角 (LA) 控制输入	LA 输入允许超前角在 0°和 58 之间以 32 独立步调节.
14	UL	LA 的上限	UL 输入决定超前角的上限 (UL = 0 ~ 5.0 V).
15	LPF	RC 低通过滤器电容	RC 低通过滤器的电容被连到此引脚. (片上包含 100 kΩ 电阻.)
16	FGC	FG 输出信号选择输入	H 或 OPEN: FG = 3 ppr L: FG = 1 ppr FGC 输入有内部上拉电阻.
17	PH	峰值保持	峰值保持电容和放电电阻被连到此引脚.
18	Gout	增益设置	Gin 和 Gout 引脚被用来放大 Idc 电平为了最优化超前角.
19	Gin		
20	Idc	电流限制控制输入	DC-link 电流被用到 Idc 输入. 参考电压为 0.5 V. Idc 输入有内部 RC 过滤器 (有 1 μs 的时间常数) 和一个数字过滤器 (有 1 μs 的时间常数).
21	V_{CC}	电源	V_{CC} = 6 ~ 16.5 V
22	V_{refout}	参考电压输出	5 V (typ.), 30 mA (max) 振荡保护的电容被连到 V_{refout} 输出.
23	U	励磁信号输出 U, (U 高-侧)	高-激活
24	V	励磁信号输出 V, (V 高-侧)	
25	W	励磁信号输出 W, (W 高-侧)	
26	X	励磁信号输出 X, (U 低-侧)	
27	Y	励磁信号输出 Y, (V 低-侧)	
28	Z	励磁信号输出 Z, (W 低-侧)	
29	FG	FG 信号输出	FGC = H 或 OPEN: FG = 3 ppr 输出 FGC = L: FG = 1 ppr 输出 *ppr: 每电角一个脉冲
30	REV	反转检测信号	REV 输出被用来检测反转的发生.

输入/输出等效电路

出于解释目的，等效电路图可能被部分省略或简化.

引脚功能	符号	输入/输出信号	内部电路
位置信号输入, U 位置信号输入, V 位置信号输入, W	HUP HUM HVP HVM HWP HWM	模拟 滞后: ±7.5 mV (typ.)	
顺时针/逆时针 旋转 L: CW H: CCW	CW/CCW	数字 L: 0.8 V (max) H: V_{refout} − 1 V (min)	
复位输入 L: 运转马达. H: 停止马达. (复位)	RES	数字 L: 0.8 V (max) H: V_{refout} − 1 V (min)	
FG 信号选择输入 H or OPEN: FG = 3 ppr L: FG = 1 ppr	FGC	数字 L: 0.8 V (max) H: V_{refout} − 1 V (min)	
电压命令信号 1.0 V < Vsp ≤ 2.1 V 刷新工作 (X, Y 和 Z 引脚有 8%的传导占空比.)	Vsp	模拟 Vsp 电压范围: 0 ~ 10 V 5.7 V ≤ Vsp ≤ 7.3 V 时, PWM 占空比周期固定在 92% (typ.). 8.2 V ≤ Vsp ≤ 10 V 时, TB6584AFNG 被放入测试模式.	
超前角控制输入 0 V: 0° 5 V: 58° (5-bit AD)	LA	要外部固定超前角, UL 和 V_{refout} 应该连在一起.根据应用到 LA 输入的电压, 超前角被线形决定. LA 电压范围: 0 ~ 5.0 V (V_{refout}) 如果 LA > V_{refout}, 用最大 58°的超前角产生励磁. 配置自动超前角控制时, LA 输入应该保持 OPEN. 此时, LA 输入可以被用来实时检查超前角.	

引脚功能	符号	输入/输出信号	内部电路
增益设置 (超前角控制电路)	Gin Gout	非-反转放大器 25 dB max Gout: 输出电压 L: GND H: V_{CC} – 1.7 V	
峰值保持 (超前角控制电路)	PH	一个峰值保持电容和放电电阻连接到 PH 引脚. 推荐 R/C 值: 100 kΩ/0.1 μF	
低通过滤器 (超前角控制电路)	LPF	一个 RC 低通过滤器的电容连接到此引脚. 片上含 100 kΩ (typ.) 电阻. 推荐 C 值: 0.1 μF	
LA 的上限	UL	如果应用到 LA 输入的电压超过由输入设置的上限, 它被钳位去限制超前角. UL = 0 ~ 5.0 V	
电流限制控制输入	Idc	模拟过滤器时间常数: 1 μs (typ.) 数字过滤器时间常数: 1 μs (typ.) Idc 电压超过 0.5 V 时,门块保护被激活. (一个载波周期后被失效.) 如果 Idc 未连接, 禁止所有励磁输出.	
参考电压输出	V_{refout}	5 ± 0.5 V (30 mA max)	

引脚功能	符号	输入/输出信号	内部电路
反转检测信号	REV	数字 推挽输出 (±1 mA (max))	
FG 信号输出	FG	数字 推挽输出 (±1 mA (max)) FGC = H or OPEN 3 ppr 输出 (3 脉冲每电角) FGC = L 1 ppr 输出 (一脉冲每电角)	
励磁信号输出, U 励磁信号输出, V 励磁信号输出, W 励磁信号输出, X 励磁信号输出, Y 励磁信号输出, Z	U V W X Y Z	数字 推挽输出(±2 mA (max)) L: 0.78 V (max) H: V_{refout} – 0.78 V (min)	

绝对最大额定值(Ta = 25°C)

特征	符号	额定值	Unit
供电电压	V_{CC}	18	V
输入电压	$V_{IN\ (1)}$	− 0.3 ~ V_{CC} (注 1)	V
	$V_{IN\ (2)}$	− 0.3 ~ V_{refout} + 0.3 (注 2)	
励磁输出电流	I_{OUT}	2	mA
V_{refout} 输出电流	I_{refout}	30 (注 3)	mA
功耗	P_D	1.1 (注 4)	W
工作温度	T_{opr}	− 30 ~ 115 (注 5)	°C

注 1: $V_{IN\ (1)}$ 引脚: Vsp, LA, 和 UL

注 2: $V_{IN\ (2)}$ 引脚: HUP, HVP, HWP, HUM, HVM, HWM CW/CCW, RES, Idc, FGC, 和 Gin

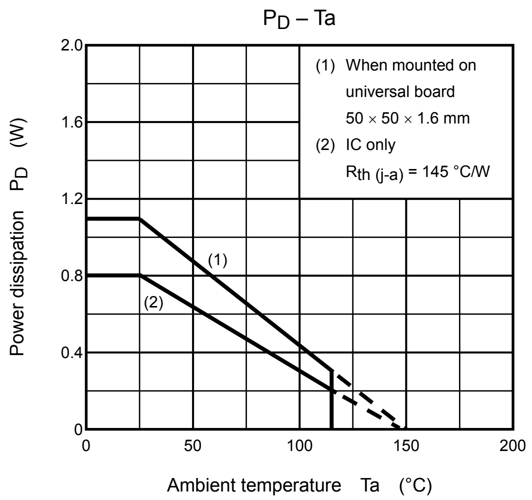
注 3: 由于 V_{refout} 引脚发送一个最大 30 mA 的输出电流，要注意输出阻抗.

注 4: 安装在宇宙板上时(50 × 50 × 1.6 mm, Cu 40%)

注 5: 工作温度范围由 P_D − Ta 特征决定.

工作范围 (Ta = 25°C)

特征	符号	Min	Typ.	Max	Unit
供电电压	V_{CC}	6	15	16.5	V
振荡频率	f_{osc}	3	4.5	6	MHz



电气特征 (Ta = 25°C, V_{CC} = 15 V)

特征		符号		测试条件	Min	Typ.	Max	Unit
供电电流		I_{CC}		V_{refout} = OPEN	—	5	8	mA
输入电流		$I_{IN (1)}$-1		V_{IN} = 5 V LA	—	25	50	μA
		$I_{IN (1)}$-2		V_{IN} = 5 V Vsp	—	35	70	
		$I_{IN (2)}$-1		V_{IN} = 5 V RES	—	50	100	
		$I_{IN (2)}$-2		V_{IN} = 0 V CW/CCW, FGC	−100	−50	—	
输入电压		V_{IN}	High	CW/CCW, RES, FGC	V_{refout} −1	—	V_{refout}	V
			Low		—	—	0.8	
		Vsp	T	正弦波励磁 ON 传导占空比= 92% (typ.)	8.2	—	10	
			H	PWM duty = 92%	5.1	5.4	5.7	
			M	Refresh → Motor startup	1.8	2.1	2.4	
			L	励磁关闭 → 刷新	0.7	1.0	1.3	
霍尔效果输入	输入敏感度	V_S		差分输入	100	—	—	mVpp
	共通-模式输入电压	V_W			1.5	—	3.5	V
	输入滞后	$V_{H (1)}$		(注)	±5.5	±7.5	±9.5	mV
输入延迟时间		T_{DT}		霍尔输入 (f_{osc} = 4.5 MHz)	—	1.0	—	μs
		T_{DC}		Idc (f_{osc} = 4.5 MHz)	—	2.5	—	
输出电压		$V_{OUT (H)}$-1		I_{OUT} = 2 mA U, V, W, X, Y, Z	V_{refout} − 0.78	V_{refout} − 0.3	—	V
		$V_{OUT (L)}$-1		I_{OUT} = −2 mA U, V, W, X, Y, Z	—	0.3	0.78	
		$V_{REV (H)}$		I_{OUT} = 1 mA REV	V_{refout} − 1.0	V_{refout} − 0.2	—	
		$V_{REV (L)}$		I_{OUT} = −1 mA REV	—	0.2	1.0	
		$V_{FG (H)}$		I_{OUT} = 1 mA FG	V_{refout} − 1.0	V_{refout} − 0.2	—	
		$V_{FG (L)}$		I_{OUT} = −1 mA FG	—	0.2	1.0	
		V_{refout}		I_{OUT} = 30 mA V_{refout}	4.5	5.0	5.5	
输出漏电流		$I_{L (H)}$		V_{OUT} = 0 V U, V, W, X, Y, Z	—	0	10	μA
		$I_{L (L)}$		V_{OUT} = V_{refout} U, V, W, X, Y, Z	—	0	10	
输出关闭时间(低-高)		T_{OFF}		(f_{osc} = 4.5 MHz), I_{OUT} = ± 2 mA	1.7	2.0	2.3	μs
电流感应		V_{DC}		Idc	0.46	0.5	0.54	V
LA 增益设置 amp		AMP_{OUT}		Gin = 100 kΩ, Gout = 10 kΩ, Idc = 0.2 V, I_{OUT} = 1 mA	2.0	2.2	2.4	V
		AMP_{OFS}		Gin = 100 kΩ, Gout = 10 kΩ, Idc = 0.2 V	—	5	—	mV
LA 极限设置精度		ΔU		UL = 2.0 V	−20	—	20	mV
LA 峰值保持输出电压		PHOUT		Gin = 100 kΩ, Gout = 10 kΩ, Idc = 0.2 V, I_{OUT} = 5 mA	2.0	2.2	2.4	V
超前角纠正		$T_{LA (0)}$		LA = 0 V or OPEN, Hall inputs = 100 Hz	—	0	—	°
		$T_{LA (2.5)}$		LA = 2.5 V, Hall inputs = 100 Hz	26	30	33	
		$T_{LA (5)}$		LA = 5 V, Hall inputs = 100 Hz	52	57	60	
V_{CC} 监视器		V_{CC} (H)		输出开启阈值	4.2	4.5	4.8	V
		V_{CC} (L)		输出关闭阈值	3.7	4.0	4.3	
		V_H		输入滞后宽	—	0.5	—	
PWM 振荡频率 (载波频率)		F_C (20)		OSC/C =330 pF, OSC/R = 9.1 kΩ	18	20	22	kHz
		F_C (18)		OSC/C = 330 pF, OSC/R = 10 kΩ	16.2	18	19.8	
最大传导占空比		T_{ON} (max)		OSC/C = 330 pF, OSC/R = 10 kΩ VSP = 5.7 V	89	92	95	%

注：生产中没测试

功能描述

1. 基本工作

启动期间，马达通过根据位置信号产生的方波励磁信号驱动. 位置信号体现 5 Hz 的转速 (f), TB6584AFNG 从位置信号推断马达位置且调制它们. TB6584AFNG 然后根据三角波形通过比较被调制的信号产生正弦波.

从启动到 5 Hz: 方波驱动 (120° 励磁); $f = f_{osc}/(2^{12} \times 32 \times 6)$

5 Hz 到: 正弦波 PWM 驱动 (180°励磁); f 大约为 5.7 Hz 当 f_{osc} = 4.5 MHz 时

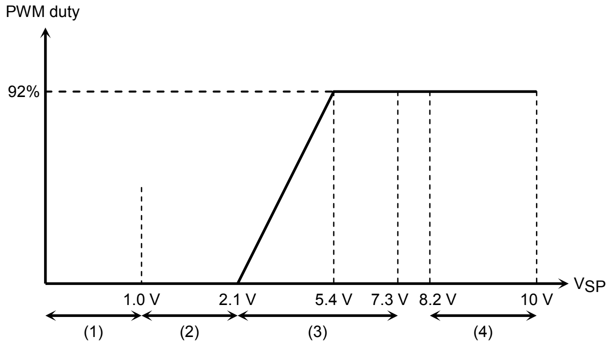
2. 电压命令(V_{SP}) 信号和升压调节

(1) Vsp ≤ 1.0 V 时:
励磁信号输出被禁用 (如，门保护被激活).

(2) 1.0 V < Vsp ≤ 2.1 V 时:
低侧励磁信号输出以一定的 (PWM 载波)频率被开启. (传导占空比周期大约 8%.)

(3) 2.1 V < Vsp ≤ 7.3 V 时:
正弦波 PWM 驱动期间, 励磁信号直接外部显示. 正弦波驱动期间, 低侧励磁信号输出以一定的 (PWM 载波)频率被强制开启. (传导占空比大约 8%.)

(4) 8.2 V ≤ Vsp ≤ 10 V (测试模式)时:
TB6584AFNG 在正弦波驱动模式下用零的超前角驱动. 然而, 其在正弦波模式下驱动以检测反转.
Vsp 到达 7.9 V (typ.)时, 超前角切换为零.
PWM 占空比被计算为 *PWM_carrier_frequency* × 92% (typ.) 且保持恒定值 (5.4 V≤ Vsp (typ.)).



3. 死区时间插入 (交叉传导保护)

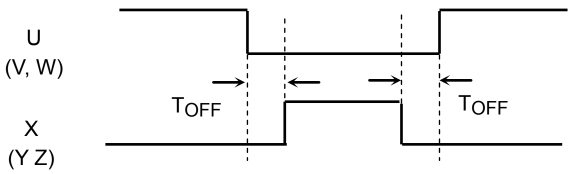
为了防止正弦波 PWM 驱动期间外部低侧和高侧功率器件间的短路，在一侧的开启和另一侧的关闭之间死区时间被数字插入.

(方波驱动期间死区时间也被执行在全占空比周期.)

$T_{OFF} = 9/f_{osc}$

$T_{OFF} \simeq 2.0\ \mu s$ 当 $f_{osc} = 4.5$ MHz 时，此 f_{osc} 为参考时钟频率

(如, CR 振荡器频率).



4. 超前角控制

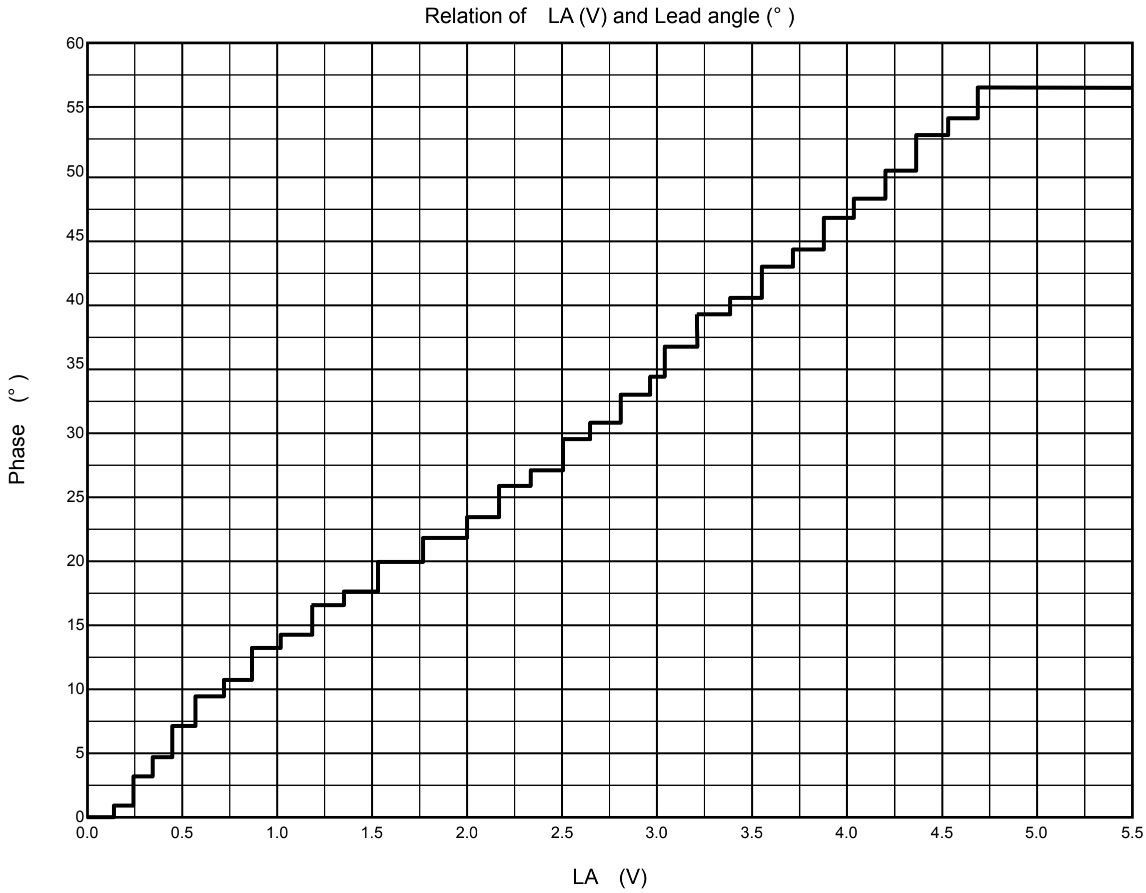
根据 LA 输入上诱导电压电平,超前角可以在 0° 和 58°之间以 32 独立步被调节，它用 0 ~ 5 V 工作.

0 V = 0°

5 V = 58° (LA 电压超过 5 V 时,58°的超前角被推断.)

Sample evaluation

Step	LA (V)	Lead angle (°)	Step	LA (V)	Lead angle (°)	Step	LA (V)	Lead angle (°)
0	0.00	0.00	11	1.72	19.92	22	3.44	40.58
1	0.16	0.94	12	1.88	21.79	23	3.59	43.01
2	0.31	3.18	13	2.03	23.47	24	3.75	44.32
3	0.47	4.68	14	2.19	25.90	25	3.91	46.75
4	0.63	7.11	15	2.34	27.12	26	4.06	48.25
5	0.78	9.44	16	2.50	29.55	27	4.22	50.49
6	0.94	10.75	17	2.66	30.86	28	4.38	52.74
7	1.09	13.18	18	2.81	33.01	29	4.53	54.05
8	1.25	14.21	19	2.97	34.41	30	4.69	56.48
9	1.41	16.55	20	3.13	36.75	31	4.84	56.48
10	1.56	17.58	21	3.28	39.27	32	5.00	56.48



5. PWM 载波频率

三角波形生成器提供一个 PWM 生成所需的 $f_{osc}/252$ 的载波频率.
(方波驱动期间三角波也被用来强制低侧三极管的打开.)

载波频率 = $f_{osc}/252$ (Hz),

此 f_{osc} = 参考时钟 (CR 振荡器) 频率

6. 反转信号

此特征提供马达每 360 电角的旋转方向.
REV 引脚上的低表示 180° 励磁模式 (有≥ 5 Hz 的霍尔效果输入).

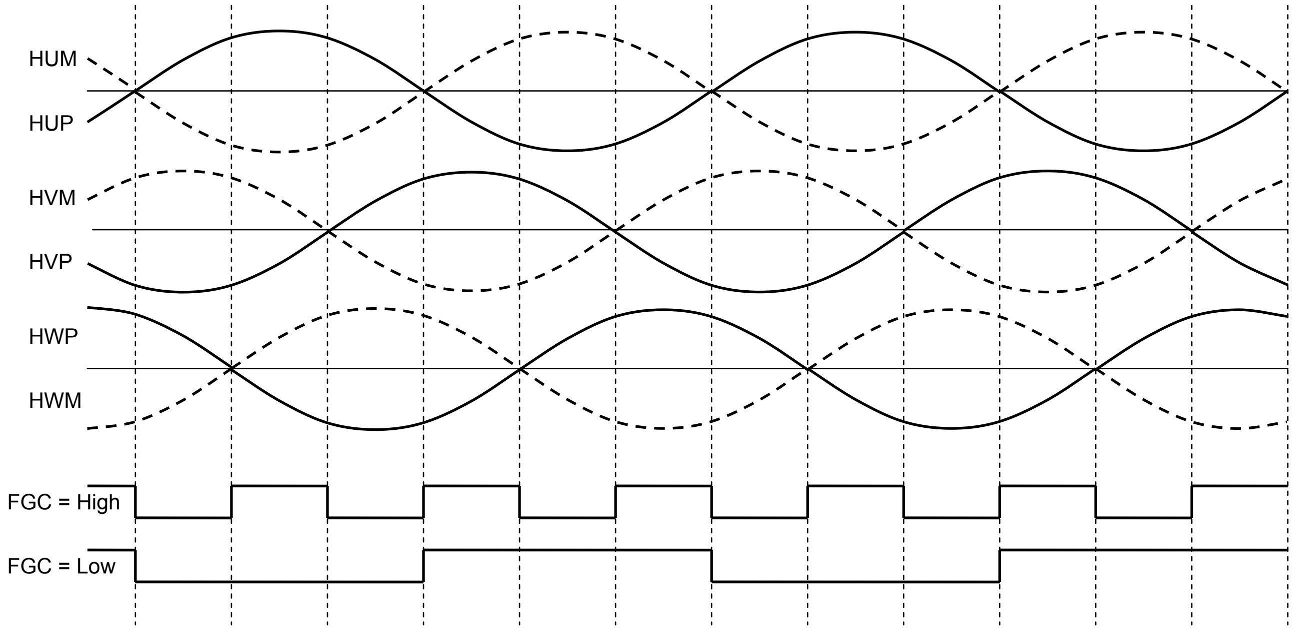
CW/CCW Pin	实际马达旋转方向	REV Pin
Low (CW)	CW (forward)	Low
	CCW (reverse)	High
High (CCW)	CW (forward)	High
	CCW (reverse)	Low

7. 旋转脉冲输出

TB6584AFNG 根据霍尔信号输出旋转脉冲. FGC 端子可以切换一个脉冲每电角或 3 脉冲每电角. 一个脉冲每电角产生自 U 相的霍尔信号. 3 脉冲每电角通过组合 U, V, 和 W 相的各上升和下降沿产生.

FGC	FG
High or Open	3 脉冲每电角
Low	1 脉冲每电角

Timing Chart of FG Signal



8. 保护-关联输入引脚

(1) 过流保护(Idc 引脚)
如果 DC-link 电流的电压超过内部参考电压,励磁信号被强制低. 过流保护在每载波周期后被禁用.
参考电压 = 0.5 V (typ.)

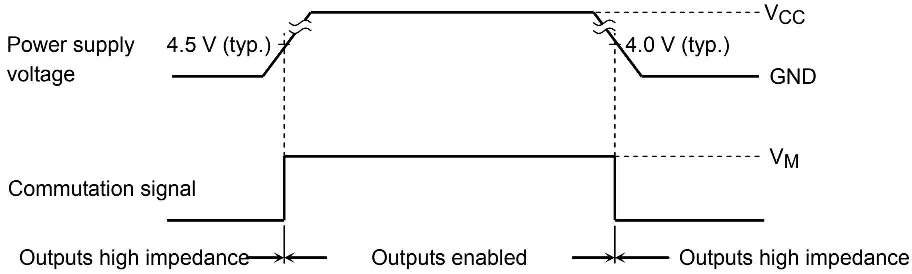
(2) 门块保护(RES 引脚)
RES 输入为高时, 励磁输出被禁用. RES 输入被设置为低或 OPEN 时, 励磁输出被再使能.
任何不规则的马达条件应该被外部硬件检测; 这些体现应该被反映到 RES 输入.

RES Pin	励磁输出信号 (U, V, W, X, Y, Z)
High	Low
Low or OPEN	The motor can be driven.

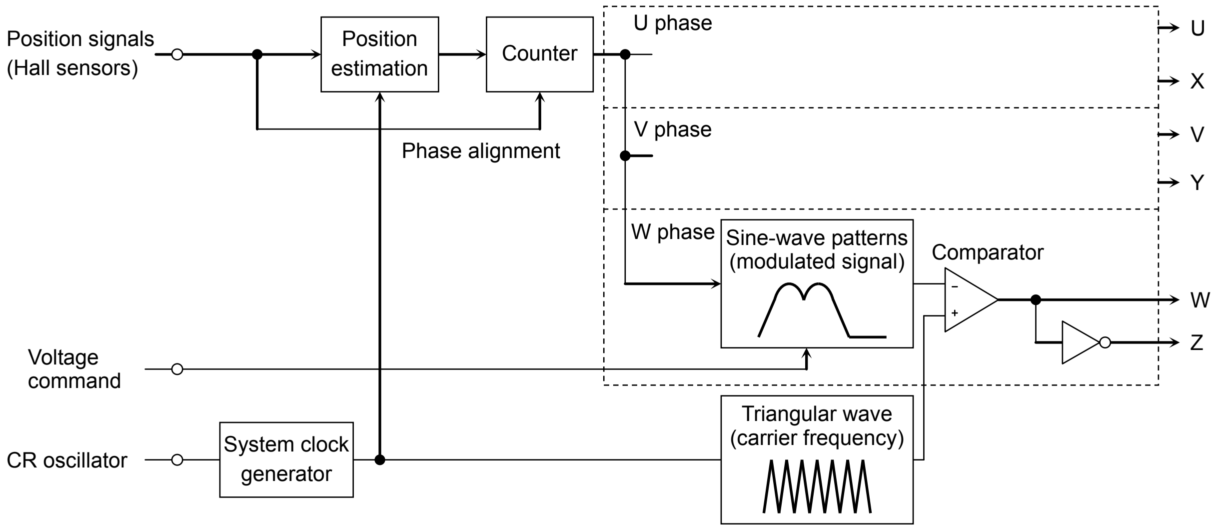
(RES = 高时, 升压电容的充电停止. 如果工作通过禁用复位重启, 升压电容不被充电.)

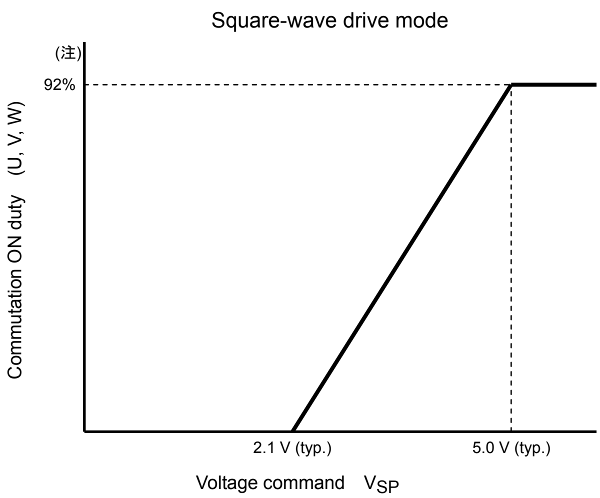
(3) 内部保护

- 异常位置信号保护
  位置信号输入 (UVW) 为全高或全低时, 励磁输出被强制关闭 (如, 设置低). 这些输入被设置为任何其他组合时, 励磁输出被再使能. (全-高和全-低条件为内部霍尔放大器输出.)
- 欠压锁定(V_{CC} 监视器)
  上电或断电期间电源电压在额定范围以外时, 励磁输出被设置为高-阻抗状态来保护外部功率器件由于短路损坏.

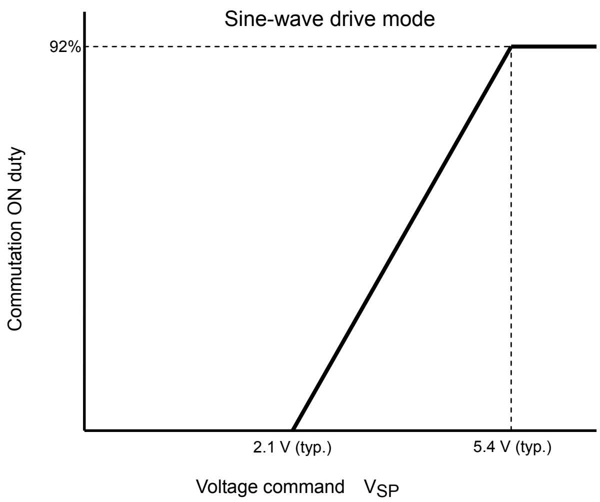


工作流





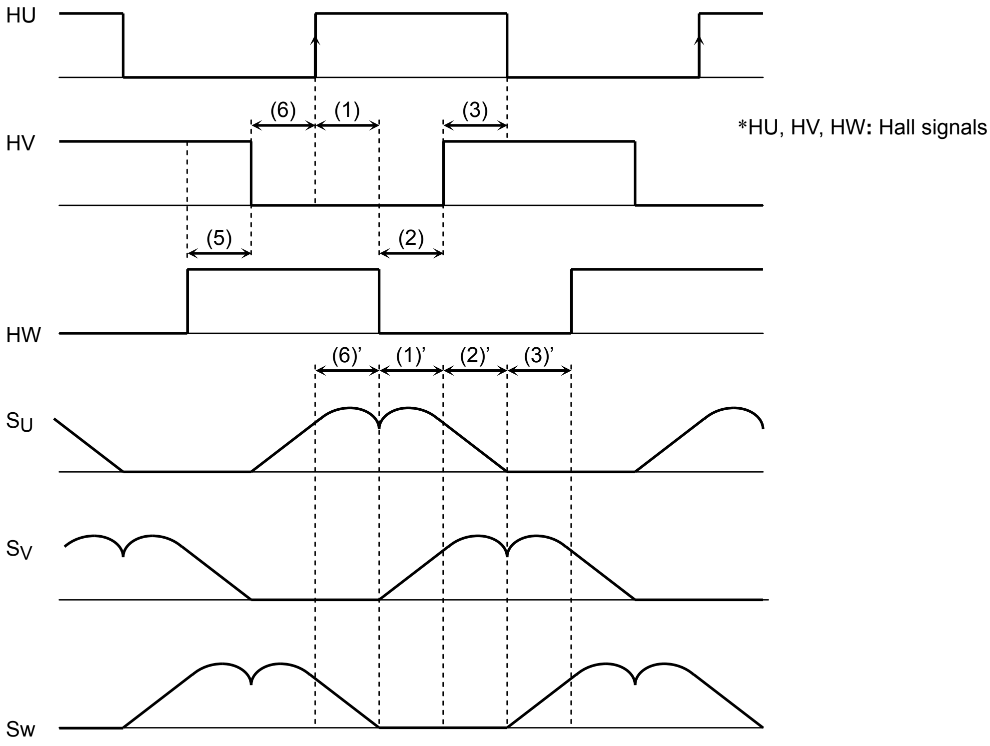
注: 传导周期被死亡时间减少. (载波周期 × 92% − T_d × 2)



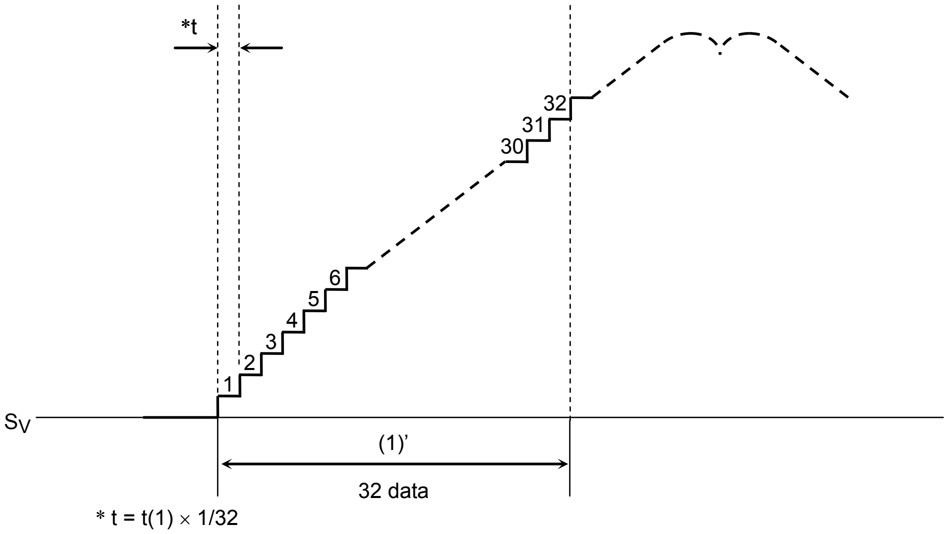
来自霍尔传感器的位置信号被调制，且被调制信号被比较一个三角波形来生成一个正弦 PWM 波形.

计数器测量周期从一个得到的三霍尔信号的上升（下降）沿 到其下一个下降（上升）沿(60 电角). 此周期被用作下一调制的 60° 相数据.

总共 32 拍组成 60 电角；每拍长等于马上进行 60° 相的第 1/32 时间周期.



上图中，被调制的波形有一个间隔（(1)'）等于 HU 的上升沿到 HW ((1))的下降沿之间 1/32 的间隔. 且被调制的波形有一个间隔（(2)'）等于 HW 的的下降沿到 HV ((2)）的上升沿之间 1/32 的间隔. 32 拍结束前如果没有一个 HU 上升沿, (2)' 变为等于(1)'直到下一个 HU 的上升沿.

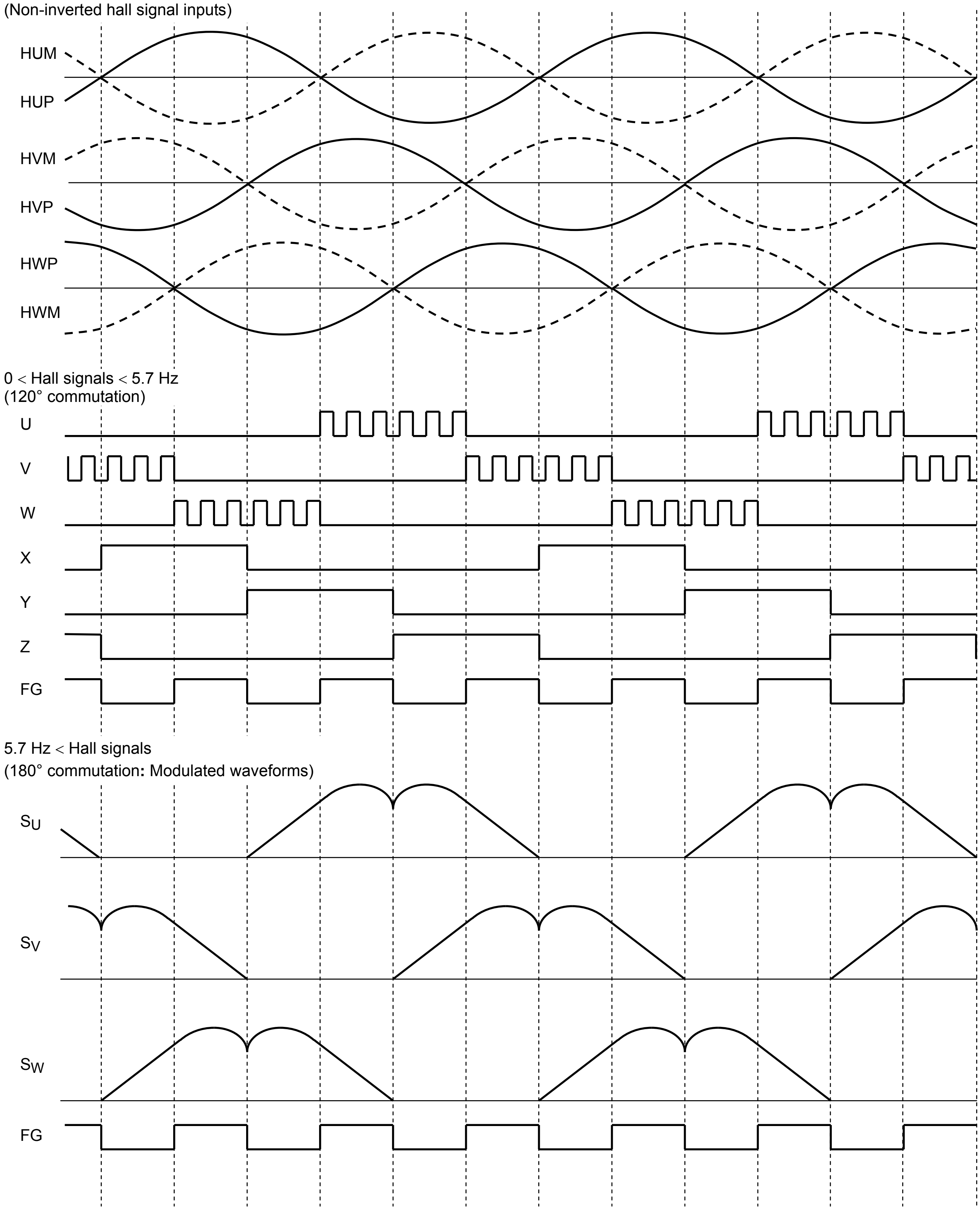


每个位置检测信号的过零的数据的相和被调制的波形被调节.

在各位置检测信号的上升和下降沿调制被复位，它每 60 电角发生. 霍尔信号在其位置以外且马达在加速或减速时，被调制的波形在各复位变为非连续.

注：上图中，出于简化目的霍尔信号被表示为方波形.

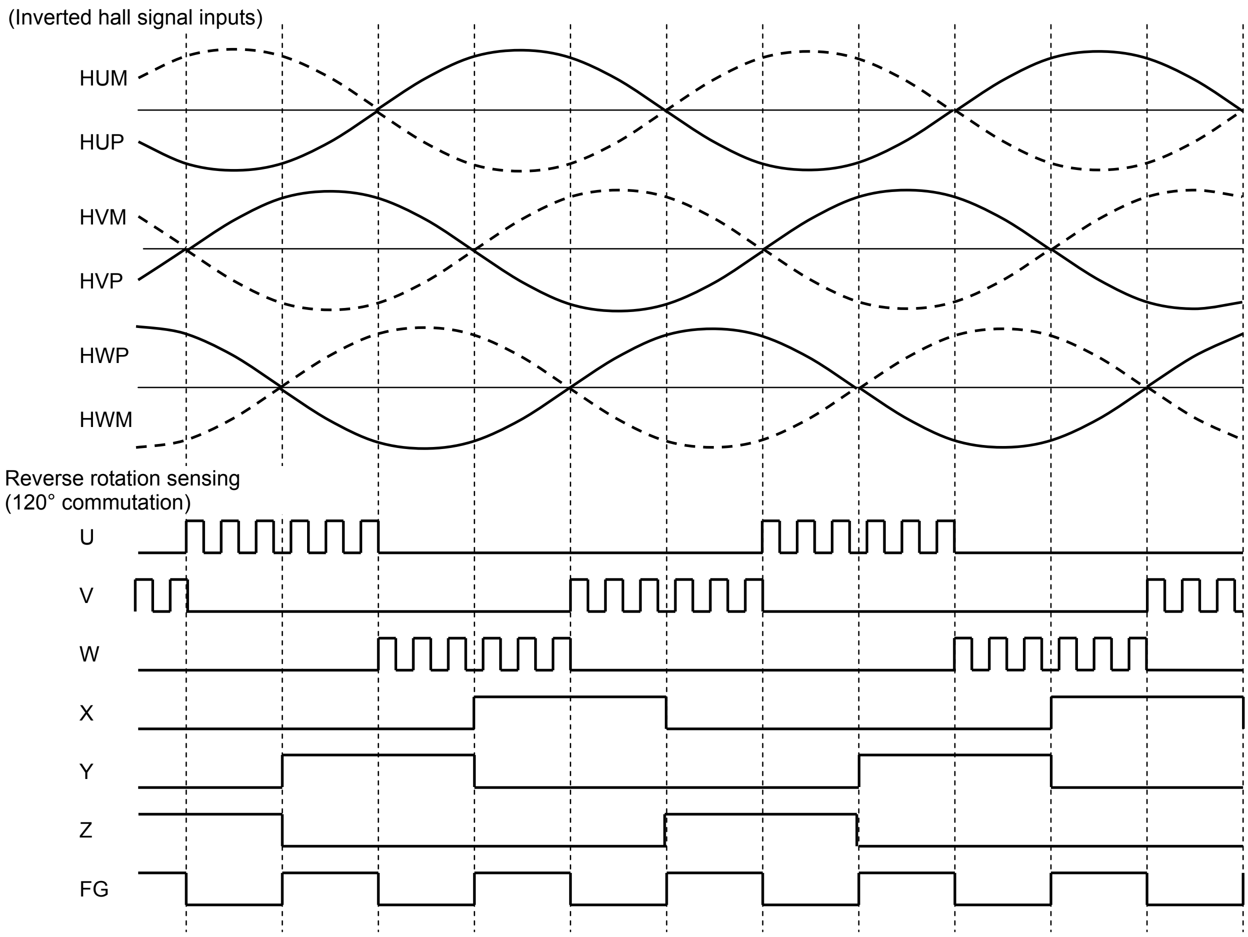
正转时序图 (CW/CCW = Low, LA = GND, FGC = High)



*: 霍尔输入频率等于或大于约 5.7 Hz (@ f_{osc} = 4.5 MHz)时，根据 LA 输入超前角控制被激活.

以上时序图被简化来描述设备的功能和动作.

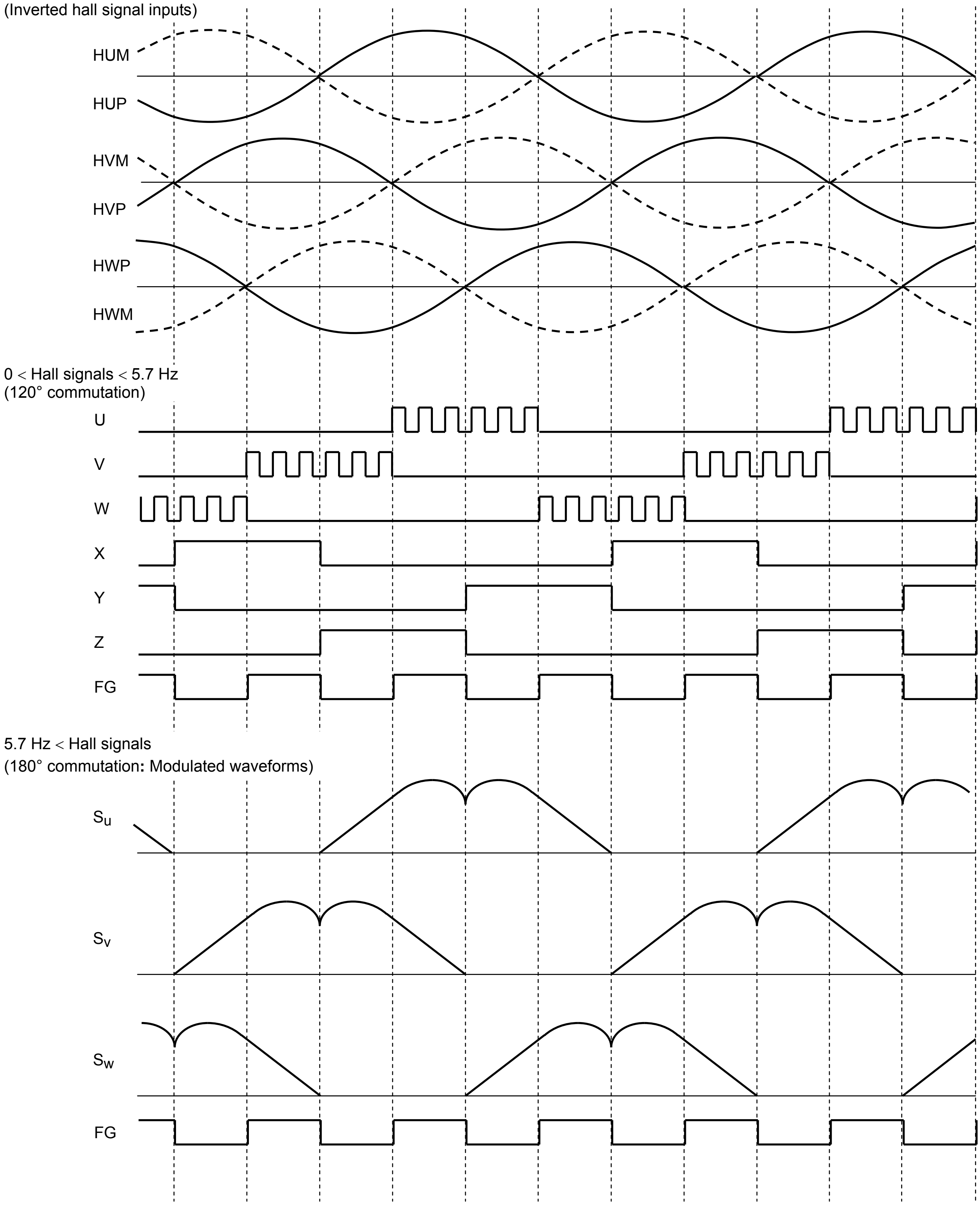
正转时序图 **(CW/CCW = Low, LA = GND, FGC=High)**



*: CW/CCW = 低时，反转的霍尔信号用 0° (反转)的超前角把 TB6584AFNG 放入 120 励磁模式.

以上时序图被简化来描述设备的功能和动作.

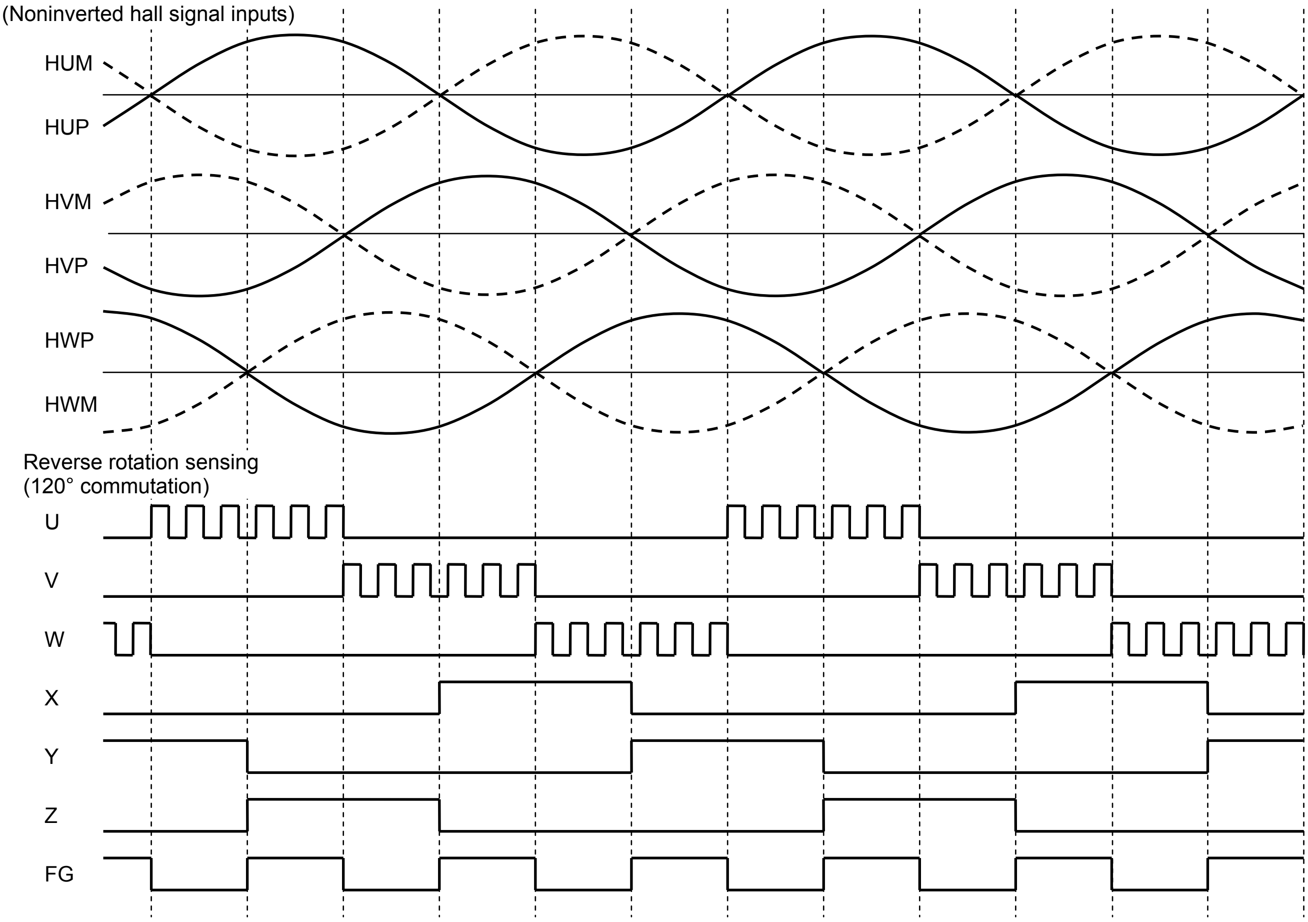
反转时序图 (CW/CCW = High, LA = GND, FGC=High)



*: 霍尔输入频率等于或大于约 5.7 Hz (@ f_{osc} = 4.5 MHz)时，根据 LA 输入超前角控制被激活.

以上时序图被简化来描述设备的功能和动作.

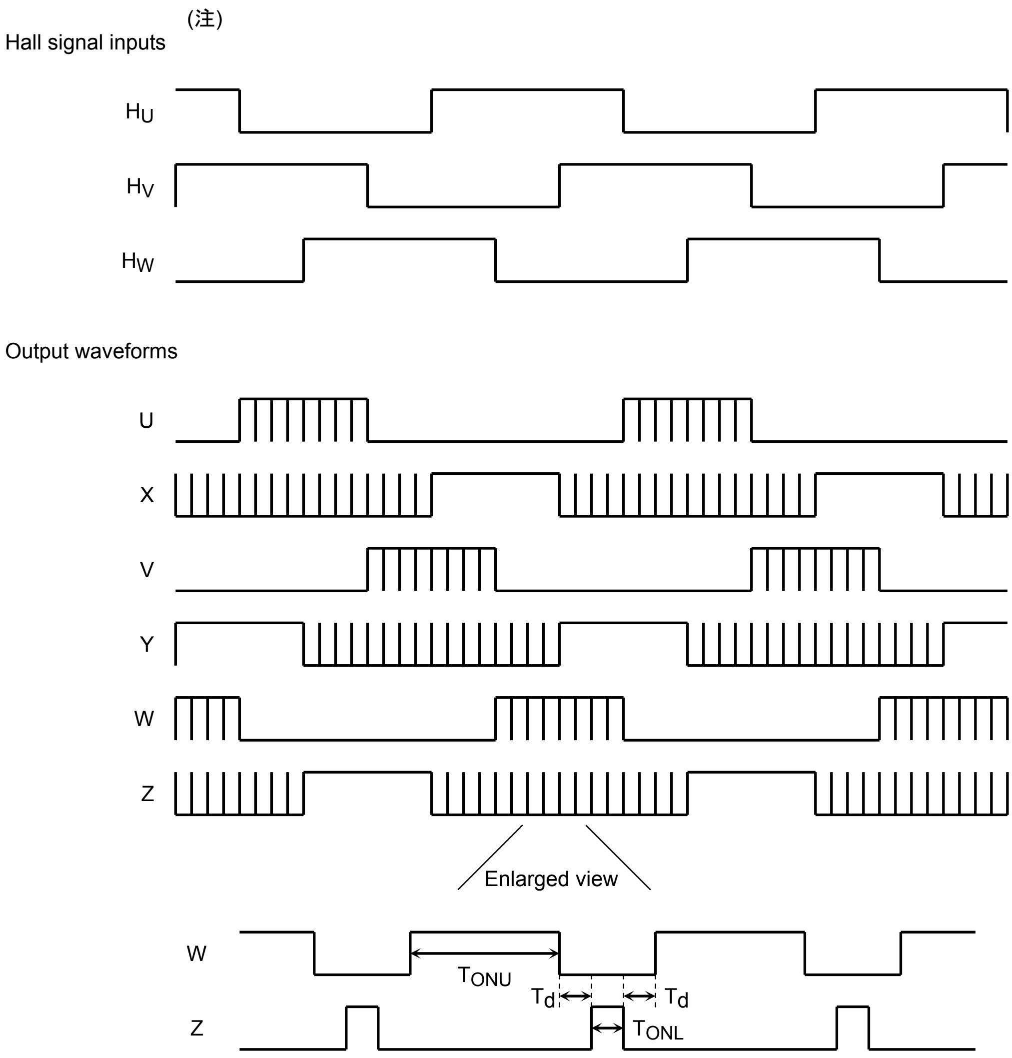
反转时序图 (CW/CCW = High, LA = GND, FGC=High)



*: CW/CCW = 高时，非反转的霍尔信号用 0° (反转)的超前角把 TB6584AFNG 放入 120° 励磁模式.

以上时序图被简化来描述设备的功能和动作.

方波驱动波形 (CW/CCW = Low)



注: 出于简化目的方波形被用在上图中.

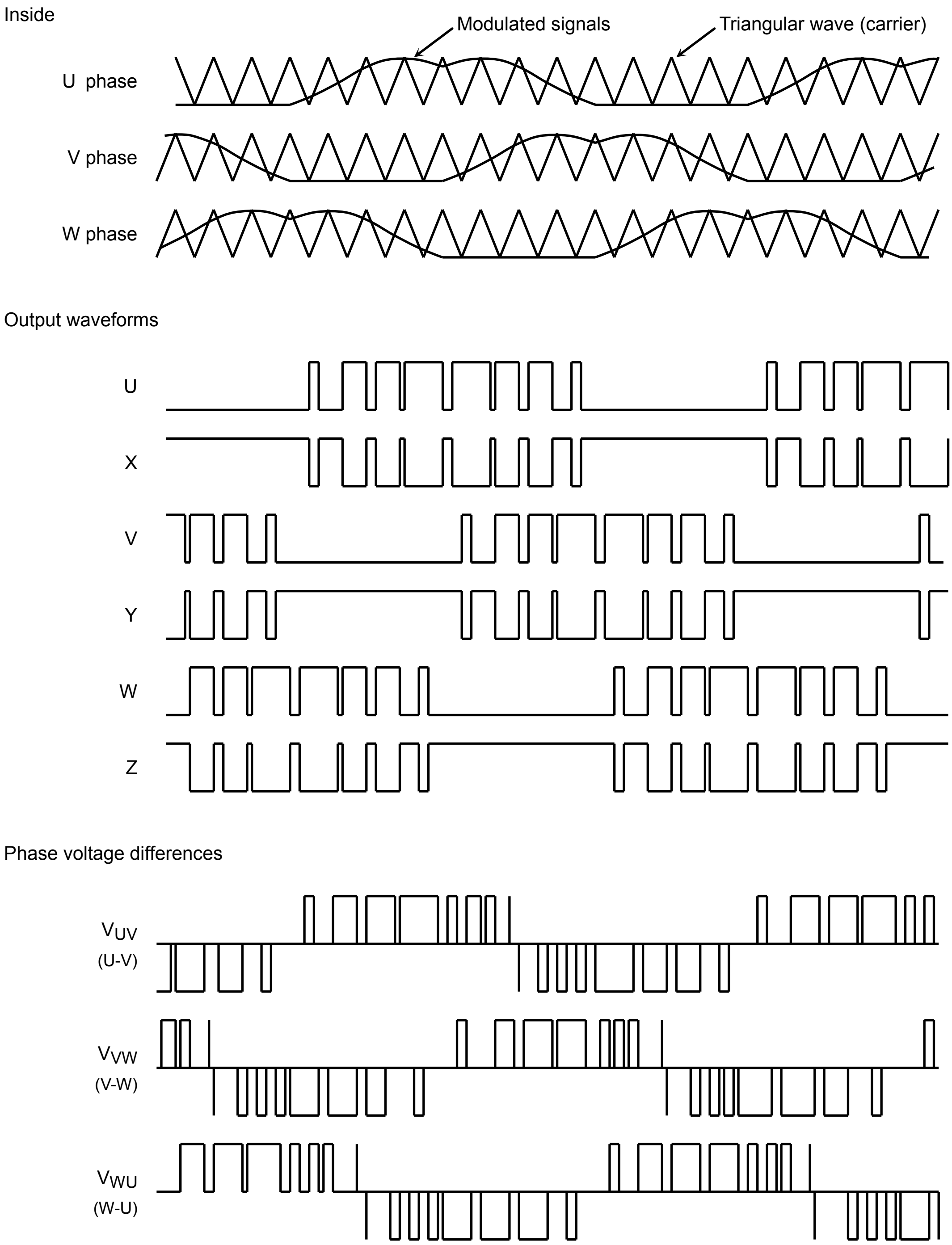
为了获得一个合适的升压, 低侧输出 (X, Y 和 Z) 被一直开启百分之八的载波周期 (T_{ONL})即使在 120°励磁模式下低侧的关闭时间期间. 如放大图所示, 低侧输出被打开时,高侧输出 (U, V 和 W) 被关闭一个死区时间周期. (T_d 随着 Vsp 输入而变化.)

载波周期= 252/f_{osc} (s)　　　死区时间: T_d = 9/f_{osc} (s) (Vsp ≥ 5.0 V,)
T_{ONL} = 载波周期 × 8% (s) (恒定不管 Vsp 输入)

方波驱动模式下, 马达速度的改变被使能, 取决于 Vsp 电压; 马达速度由 T_{ONU} 的占空比周期决定. (见页 15 上方波驱动模式图.)

注: 启动时, 霍尔信号频率约 5.7 Hz 或更低 (@ f_{osc} = 4.5 MHz)时且马达以相反于 TB6584AFNG (REV = 高)的设置方向旋转时,马达由方波驱动.

正弦波驱动波形 **(CW/CCW = Low)**

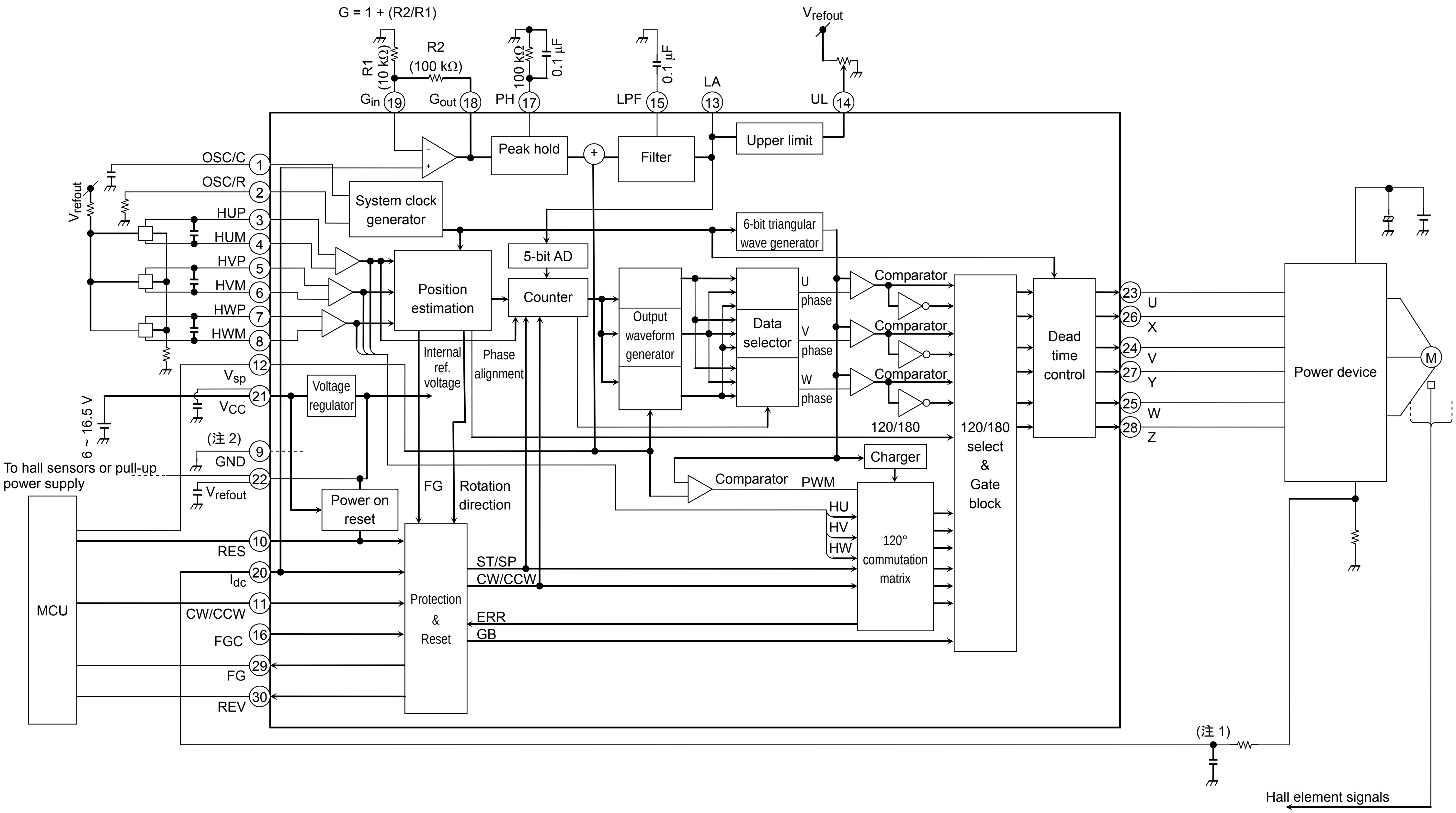


正弦波驱动模式下，被调制信号的幅度随着 Vsp 电压而变化，且马达速度随输出波形的传导占空比周期变化.（见页 15 上正弦波驱动模式图.）

三角波频率 = 载波频率 = $f_{osc}/252$ (Hz)

注：启动时，霍尔信号频率约 5.7 Hz 或更高 (@ f_{OSC} = 4.5 MHz)时且马达以相同于 TB6584AFNG (REV = 低)的设置方向旋转时,马达由正弦波驱动.

应用电路例



注 1: 需要连接地防止 IC 由于噪声误动作.

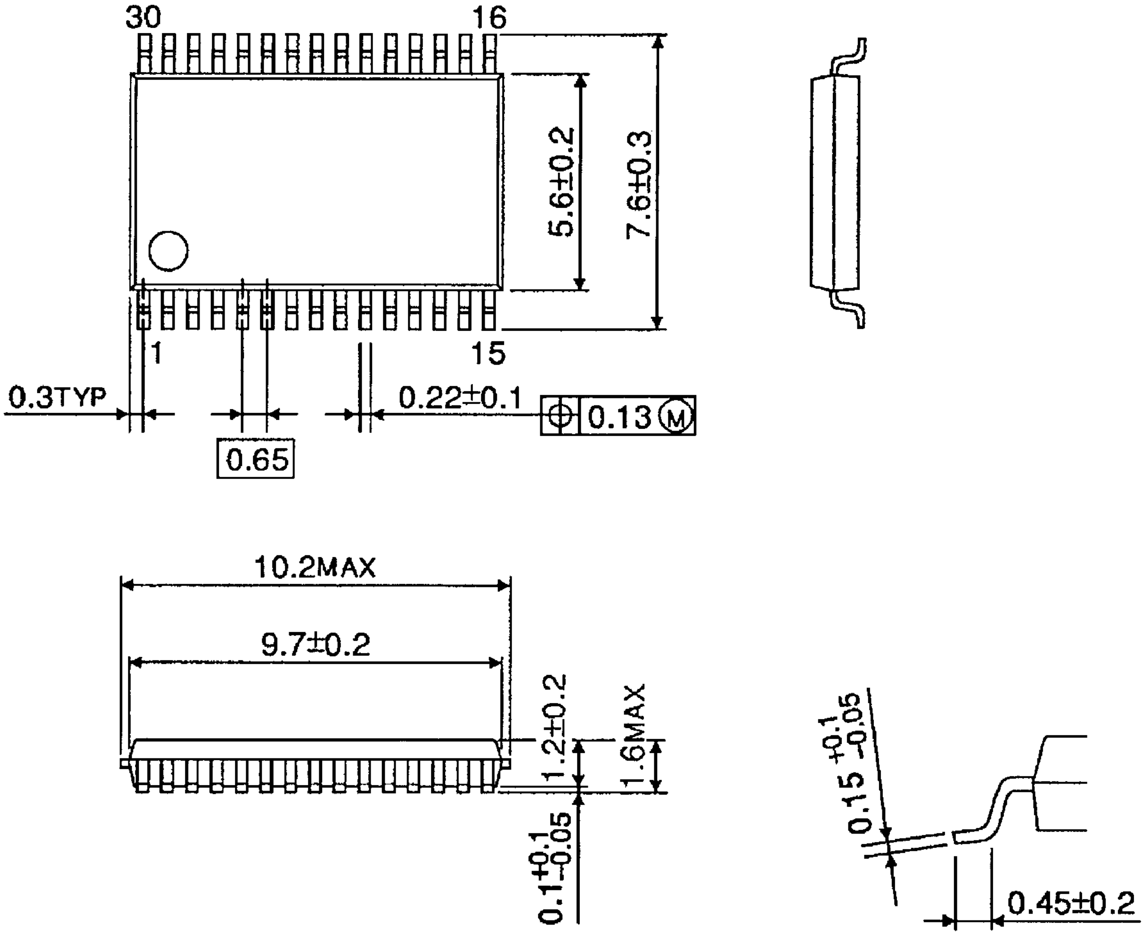
注 2: 应用电路上连接 GND 到信号地.

注 3: 在设计输出, V_{CC}, 和 GND 线时需要额外小心, 因为 IC 可能损坏或爆炸由于输出间短路, 短路到 V_{CC} 或短路到地.
被插入错误方向时 IC 也可能损坏或爆炸.

注 4: 确保 TB6584AFNG 可以输出 100 ns 的小脉冲因为输出时它不限制最小脉冲宽度.

封装尺寸

SSOP30-P-300-0.65 Unit : mm



重量: 0.17 g (typ.)

Notes on Contents

1. Block Diagrams

Some of the functional blocks, circuits, or constants in the block diagram may be omitted or simplified for explanatory purposes.

2. Equivalent Circuits

The equivalent circuit diagrams may be simplified or some parts of them may be omitted for explanatory purposes.

3. Timing Charts

Timing charts may be simplified for explanatory purposes.

4. Absolute Maximum ratings

The absolute maximum ratings of a semiconductor device are a set of ratings that must not be exceeded, even for a moment. Do not exceed any of these ratings. Exceeding the rating(s) may cause device breakdown, damage, deterioration or ignition, and may result injury by explosion or combustion.
Applications using the device should be designed so that no maximum rating will ever be exceeded under any operating conditions.
It must be ensured that the device is used within the specified operating range.

5. Application Circuits

The application circuits shown in this document are provided for reference purposes only. Thorough evaluation is required, especially at the mass production design stage.
Toshiba does not grant any license to any industrial property rights by providing these examples of application circuits.

6. Test Circuits

Components in the test circuits are used only to obtain and confirm the device characteristics. These components and circuits are not guaranteed to prevent malfunction or failure from occurring in the application equipment.

IC Usage Considerations

Notes on handling of ICs

(1) The absolute maximum ratings of a semiconductor device are a set of ratings that must not be exceeded, even for a moment. Do not exceed any of these ratings.
Exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.

(2) Use an appropriate power supply fuse to ensure that a large current does not continuously flow in case of over current and/or IC failure. The IC will fully break down when used under conditions that exceed its absolute maximum ratings, when the wiring is routed improperly or when an abnormal pulse noise occurs from the wiring or load, causing a large current to continuously flow and the breakdown can lead smoke or ignition. To minimize the effects of the flow of a large current in case of breakdown, appropriate settings, such as fuse capacity, fusing time and insertion circuit location, are required.

(3) If your design includes an inductive load such as a motor coil, incorporate a protection circuit into the design to prevent device malfunction or breakdown caused by the current resulting from the inrush current at power ON or the negative current resulting from the back electromotive force at power OFF. IC breakdown may cause injury, smoke or ignition.
Use a stable power supply with ICs with built-in protection functions. If the power supply is unstable, the protection function may not operate, causing IC breakdown. IC breakdown may cause injury, smoke or ignition.

(4) Do not insert devices in the wrong orientation or incorrectly.
Make sure that the positive and negative terminals of power supplies are connected properly.
Otherwise, the current or power consumption may exceed the absolute maximum rating, and exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.
In addition, do not use any device that is applied the current with inserting in the wrong orientation or incorrectly even just one time.

Points to Remember on Handling of ICs

(1) Over current protection circuit
Over current protection circuits (referred to as current limiter circuits) do not necessarily protect ICs under all circumstances. If the Over current protection circuits operate against the over current, clear the over current status immediately.
Depending on the method of use and usage conditions, such as exceeding absolute maximum ratings can cause the over current protection circuit to not operate properly or IC breakdown before operation. In addition, depending on the method of use and usage conditions, if over current continues to flow for a long time after operation, the IC may generate heat resulting in breakdown.

(2) Heat radiation design
In using an IC with large current flow such as power amp, regulator or driver, please design the device so that heat is appropriately radiated, not to exceed the specified junction temperature (TJ) at any time and condition. These ICs generate heat even during normal use. An inadequate IC heat radiation design can lead to decrease in IC life, deterioration of IC characteristics or IC breakdown. In addition, please design the device taking into considerate the effect of IC heat radiation with peripheral components.

(3) Back-EMF
When a motor rotates in the reverse direction, stops or slows down abruptly, a current flow back to the motor's power supply due to the effect of back-EMF. If the current sink capability of the power supply is small, the device's motor power supply and output pins might be exposed to conditions beyond absolute maximum ratings. To avoid this problem, take the effect of back-EMF into consideration in system design.

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